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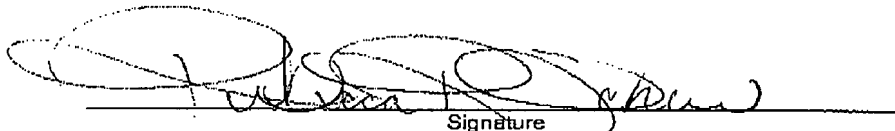
Application No.: 10/697,618

Attorney Docket No.: 200312535-1

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Transmitted, herewith, are the following documents:

1. Transmittal of Appeal Brief with Duplicate Copy (2 pages)
2. Certificate of Transmission (1 page)
3. Appeal Brief (22 pages).

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HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

PATENT APPLICATION

ATTORNEY DOCKET NO. 200312535-1IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): James O'Neil et al.

Confirmation No.: 7287

Application No.: 10/697,618

Examiner: MCDONALD, Rodney Glenn

Filing Date: October 29, 2003

Group Art Unit: 1753

Title: Method of Forming Thin-Film Electrodes

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450TRANSMITTAL OF APPEAL BRIEFTransmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on July 9, 2007.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:☐ 1st Month
\$120☐ 2nd Month
\$450☐ 3rd Month
\$1020☐ 4th Month
\$1590☐ The extension fee has already been filed in this application.☒ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.Please charge to Deposit Account 08-2025 the sum of \$ 500. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.☐ I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:
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Respectfully submitted,

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By 

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of

James O'Neill et al.

Application No. 10/697,618

Filed: October 29, 2003

For: Method of Forming Thin-Film
Electrodes

Group Art Unit: 1753

Examiner: McDonald, Rodney G.

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an Appeal Brief under Rule 41.37 appealing the decision of the Primary Examiner dated May 18, 2007 (the "final Office Action"). Each of the topics required by Rule 41.37 is presented herewith and is labeled appropriately.

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I. Real Party in Interest

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. Related Appeals and Interferences

There are no appeals or interferences related to the present application of which the Appellants are aware.

III. Status of Claims

Claims 38-66 were withdrawn under a previous Restriction Requirement and cancelled previously without prejudice or disclaimer to expedite the prosecution of this application. Thus, claims 1-37 and 67-86 are currently pending.

In the final Office Action, claims 12-14 and 67-86 were allowed. Consequently, these claims are not at issue in this appeal and do not appear in the following Appendix. Additionally, claims 27-29 were indicated in the final Office Action as containing allowable subject matter. Consequently, claims 27-29 are also not at issue in this appeal.

Claims 1-11, 15-26 and 30-37 stand finally rejected. Appellant hereby appeals the final rejection of claims 1-11, 15-26 and 30-37, which claims appear in the following Appendix.

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IV. Status of Amendments

No amendments have been filed subsequent to the final Office Action of May 18, 2007, from which Appellant takes this appeal.

V. Summary of Claimed Subject Matter

During the past several years, the popularity and viability of fuel cells for producing both large and small amounts of electricity has increased significantly. Fuel cells conduct an electrochemical reaction with reactants such as hydrogen and oxygen to produce electricity and heat. Fuel cells are cleaner than other sources of power, such as devices that combust hydrocarbons. (Appellant's specification, paragraph 0001).

Most fuel cells include an electrolyte made of a solid-state material such as an ion conducting ceramic. In order to provide adequate ionic conductivity in the electrolyte, some fuel cells typically operate in the 500 to 1000° C temperature range. On each side of the electrolyte is an electrode; an anode on one side and a cathode on the other. An oxidant such as air is fed to the cathode that supplies oxygen ions to the electrolyte. A fuel such as hydrogen or methane is fed to the anode where it reacts with oxygen ions transported through the electrolyte. This reaction produces electrons, which are then delivered to an external circuit as useful power. (Appellant's specification, paragraph 0003).

Throughout the operation of a typical fuel cell, the cell is often cycled between room temperature and its full operating temperature. This thermal cycling can effectively reduce the service life of the fuel cell by compromising the seals or breaking the structurally brittle ceramic cells. Furthermore, expansion of the anode and cathode through redox cycling is a mechanism for considerable stress. In the case of the anode which may be made of cermet, the metallic portion of the cermet will become oxidized when the fuel supply is shut down.

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The resulting oxidation causes an expansion of the anode, which can lead to cell failure. A similar effect can also be observed to occur for the cathode. Some systems attempt to address this through sophisticated start-up and shut-down procedures that expend additional fuel, adopt continuous-operation practices, or attempt to identify very well thermally matched materials that are resilient to thermal cycling at the expense of device performance. (Appellant's specification, paragraph 0004).

To address these issues, Appellant has disclosed and claimed a method of forming a fuel cell electrode that includes providing a substrate and at least one deposition device, developing a deposition characteristic profile having at least one porous layer based on pre-determined desired electrode properties, forming a film in accordance with the deposition characteristic profile by sputtering material from the deposition device while varying a relative position of the substrate in relation to the deposition device with respect to at least a first axis. (Appellant's specification, paragraph 0023).

This method provides a way for thin film electrodes to be made with precise control of compositional and morphological gradients through the film thickness. Such films have superior volumetric energy (energy per 1 μm of thickness) as anode and cathode of a fuel cell, particularly a solid oxide fuel cell (SOFC). Stability of anode (cermet) to red-ox cycling is also improved due to the presence of "nano-chambers" connected by less porous material (in z-direction). As a result, thin-film SOFC performance may be up to 850 mW/cm² or higher. In addition, the thin-film architecture by definition requires less material than other solutions. (Appellant's specification, paragraph 0038).

The method disclosed and claimed by Appellant provides desired and unique thin-film architecture. Film composition and porosity/density are adjusted with a periodicity through the bulk film. Modulation of the porosity enables improved mechanical performance of the

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films. Adjusting the film composition in concert with film porosity modulation improves catalytic reaction rate and mobility of the active species because surface mobility rates are significantly higher than bulk mobility rates. (Appellant's specification, paragraph 0042).

Claim 1 recites:

A method of forming a thin-film fuel cell electrode, (*Appellant's specification, paragraph 0023*) comprising:

providing a substrate (310) and at least one deposition device (*Appellant's specification, paragraph 0030*);

developing a deposition characteristic profile (320) having at least one porous layer based on pre-determined desired electrode properties (*Appellant's specification, paragraph 0031-2*); and

forming a film (350) in accordance with said deposition characteristic profile by depositing material from said deposition device while varying a relative position of said substrate in relation to said deposition device with respect to at least a first axis (*Appellant's specification, paragraph 0037*).

VI. Grounds of Rejection to be Reviewed on Appeal

The final Office Action of May 18, 2007 made the following grounds of rejection:

(1) Claims 1, 2, 5, 6, 9, 15, 16, 20, 21, 24, 31, 32 and 34-36 were rejected under 35 U.S.C. § 103(a) based on the combined teachings of U.S. Patent No. 5,395,704 to Barnett et al. ("Barnett") and U.S. Patent No. 6,668,207 to Montcalm et al. ("Montcalm").

(2) Claims 3 and 17 were rejected under 35 U.S.C. § 103(a) based on the combined teachings of Barnett, Montcalm and Tsai et al. (of record) ("Tsai").

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(3) Claims 4 and 19 were rejected under 35 U.S.C. § 103(a) over the combined teachings of Barnett, Montcalm and Ueda (Japan 63-195263) (of record).

(4) Claims 7, 8, 10, 11, 18, 22, 25, 26, 30 and 33 were rejected under 35 U.S.C. § 103(a) over the combined teachings of Barnett, Montcalm and Kobayashi (Japan 05-021347) (of record) ("Kobayashi").

(5) Claim 23 was rejected under 35 U.S.C. § 103(a) over the combined teachings of Barnett, Montcalm, Kobayashi and U.S. Patent No. 6,364,956 to Wang et al. ("Wang").

(6) Claim 37 was rejected under 35 U.S.C. § 103(a) over the combined teachings of Barnett, Montcalm and U.S. Patent No. 5,773,162 to Surampudi et al. ("Surampudi").

Therefore, Appellant hereby requests review of these grounds of rejection in the present appeal.

VII. Argument

(1) Claims 1, 2, 5, 6, 9, 15, 16, 20, 21, 24, 31, 32 and 34-36 are patentable over Barnett and Montcalm:

Claim 1 recites:

A method of forming a thin-film fuel cell electrode, comprising:
providing a substrate and at least one deposition device;
developing a deposition characteristic profile having at least one porous layer
based on pre-determined desired electrode properties; and
forming a film in accordance with said deposition characteristic profile by
depositing material from said deposition device while varying a relative position of
said substrate in relation to said deposition device with respect to at least a first axis.
(Emphasis added).

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Appellant's specification explains the connection between the claimed "deposition characteristic profile" and the "desired *electrode* properties." (Emphasis added). According to Appellant's specification, "the present process provides desired and unique thin-film architecture. Film composition and porosity/density are adjusted with a periodicity through the bulk film. Modulation of the porosity enables improved mechanical performance of the films. *Adjusting the film composition in concert with film porosity modulation improves catalytic reaction rate and mobility of the active species because surface mobility rates are significantly higher than bulk mobility rates.*" (Appellant's specification, paragraph 0042) (emphasis added).

[Consequently], the present method provides a way for thin film electrodes to be made with precise control of compositional and morphological gradients through the film thickness. Such films have superior volumetric energy (energy per 1 μm of thickness) as anode and cathode of SOFC. Stability of anode (cermet) to red-ox cycling is also improved due to the presence of "nano-chambers" connected by less porous material (in z-direction). As a result, thin-film SOFC performance may be up to 850 mW/cm² or higher. In addition, the thin-film architecture by definition requires less material than other solutions. (Appellant's specification, paragraph 0038).

This subject matter is entirely outside the scope and content of the cited prior art. Specifically, the proposed combination of prior art fails to teach or suggest "developing a deposition characteristic profile ... *based on pre-determined desired electrode properties.*" (Emphasis added).

Barnett teaches using magnetron sputtering to form fuel cell electrodes. (Barnett, abstract). However, Barnett does not teach or suggest any use of a deposition characteristic profile to govern deposition. The final Office Action acknowledges this by stating that the "difference between Barnett et al. and the present claims is that the deposition characteristic profile for the film is not discussed." (Action of 5/18/07, p. 3).

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However, the Office Action appears to overlook that claim 1 has not merely recited use of a deposition characteristic profile for the film. Rather, claim 1 recites a relationship between the deposition characteristic profile and desired "electrode properties" that better enable the film to function as a fuel cell electrode. Specifically, claim 1 recites "A method of forming a thin-film fuel cell electrode, comprising ...developing a deposition characteristic profile ... *based on pre-determined desired electrode properties.*" (Claim 1) (emphasis added).

This claimed relationship between a deposition characteristic profile and desired "electrode properties," i.e., "developing a deposition characteristic profile ... based on pre-determined desired electrode properties," is entirely outside the scope and content of the cited prior art.

Having noted that Barnett does not teach or suggest developing a deposition characteristic, the Office Action cites to Montcalm. (Action of 5/18/07, p. 3). However, Montcalm has nothing to do with the formation of fuel cell electrodes and, therefore, cannot teach or suggest "developing a deposition characteristic profile ... *based on pre-determined desired electrode properties.*" (Emphasis added).

Montcalm teaches using vapor or sputtering deposition primarily to form *optical films*. (Montcalm, col. 1, lines 34-40 and col. 4, lines 29-40). Montcalm does not ever teach, suggest or even mention using a thin film to form an electrode as in a fuel cell. Consequently, Montcalm cannot possibly teach or suggest the claimed "developing a deposition characteristic profile having at least one porous layer *based on pre-determined desired electrode properties.*" (Emphasis added).

Moreover, Montcalm teaches profiles that only govern the "thickness" of a deposited layer. (Montcalm, col. 7, lines 29-33). The final Office Action notes that Montcalm teaches

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“a deposited thickness profile which is based on the film property of achieving a uniform thickness.” (Action of 5/18/07, p. 10). Again, Appellant notes that this uniform thickness is desired for an *optical film*. (Montcalm, col. 1, lines 34-40 and col. 4, lines 29-40). Montcalm does not teach or suggest the claimed “developing a deposition characteristic profile ... *based on pre-determined desired electrode properties*.” (Emphasis added). Neither of the cited prior art references teach or suggest this subject matter.

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. As demonstrated above, the scope and content of the prior art, as evidenced by Barnett and Montcalm, does not include or suggest “developing a deposition characteristic profile ... *based on pre-determined desired electrode properties*.” (Emphasis added).

This difference between the claimed subject matter and prior art is tremendously significant because, as explained in Appellant’s specification,

the present method provides a way for thin film electrodes to be made with precise control of compositional and morphological gradients through the film thickness. Such films have superior volumetric energy (energy per 1 μm of thickness) as anode and cathode of SOFC. Stability of anode (cermet) to red-ox cycling is also improved due to the presence of “nano-chambers” connected by less porous material (in z-direction). As a result, thin-film SOFC performance may be up to 850 mW/cm² or higher. In addition, the thin-film architecture by definition requires less material than other solutions.

(Appellant’s specification, paragraph 0038).

This method and these consequent advantages are not available from the cited prior art.

Consequently, claim 1 recites subject matter that is outside the scope and content of the cited prior art and which provides significant advantages not available to the prior art.

Therefore, Barnett and Montcalm will not support a rejection of claim 1 under § 103 and

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Graham. For at least these reasons, the rejection of claim 1 and its dependent claims should not be sustained.

(2) Claims 3 and 17 are patentable over Barnett, Montcalm and Tsai et al.:

This rejection is respectfully traversed for at least the same reasons given above in favor of the patentability of claim 1 in light of the ineffective rejection based on Barnett and Montcalm and for the following additional reason.

Claim 3 recites "wherein forming said film further comprises varying a bias of said substrate to a deposited material." Claim 17 recites similar subject matter. Appellant notes that claims 3 and 17 recite varying the bias of the substrate during formation of a particular film that is formed "in accordance with said deposition characteristic profile." (Claim 1).

In contrast, Tsai appears to teach varying the bias of the substrate between the formation of different films. Tsai does not appear to teach or suggest, as recited in claims 3 and 17, varying a bias of a substrate during formation of a particular film that is formed "in accordance with said deposition characteristic profile."

Consequently, claims 3 and 17 recite subject matter that is outside the scope and content of the cited prior art and which provides significant advantages not available to the prior art. Therefore, Barnett, Montcalm and Tsai will not support a rejection of claims 3 and 17 under § 103 and *Graham*. For at least these reasons, the rejection of claim 1 and its dependent claims should not be sustained.

(3) Claims 4 and 19 are patentable over Barnett, Montcalm and Ueda:

Claims 4 and 19 were rejected under 35 U.S.C. § 103(a) over the combined teachings of Barnett, Montcalm and Ueda (Japan 63-195263) (of record). This rejection is respectfully

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traversed for the same reasons given above with respect to claim 1 and for at least the following additional reasons.

Claim 4 recites “wherein forming said film further comprises varying an applied magnetic field.” Claim 19 recites similar subject matter. The Office Action concedes that Barnett and Montcalm fail to teach or suggest this subject matter. (Action of 5/18/07, p. 5). Consequently, the Action cites Ueda. (*Id.*).

Ueda teaches a “means of regulating magnetic flux density in a discharge atmosphere on a target of a magnetic body so as to enable stable magnetron discharge at all times” “[t]o successively obtain *homogenous thin film*.” (Ueda, abstract). Thus, Ueda teaches using a means of regulating magnetic flux to form a *homogenous* thin film.

This is in complete contrast to Appellant’s claimed method. Appellant has disclosed and claimed a method for forming a film that is *not* homogenous. Rather, Appellant recites “developing a deposition characteristic profile ... based on pre-determined desired electrode properties.” As explained above, this involves “porosity/density [that] are adjusted with a periodicity through the bulk film” and, “[a]djusting the film composition in concert with film porosity modulation improves catalytic reaction rate and mobility of the active species.” (Appellant’s specification, paragraph 0042) (emphasis added). Consequently, the film formed in accordance with a deposition characteristic profile based on desired electrode properties is a *non-homogenous* film.

Specifically, claim 4 recites “developing a deposition characteristic profile having at least one porous layer based on pre-determined desired electrode properties; and forming a film in accordance with said deposition characteristic profile” (claim 1) “wherein forming said film further comprises varying an applied magnetic field” (claim 4). Claim 19 recites similar subject matter. In contrast, Ueda, which teaches varying an applied magnetic field to

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form a *homogenous* layer, actually teaches away from the claimed method of varying an applied magnetic field to form a film in accordance with a deposition profile based on pre-determined desired electrode properties.

Thus, scope and content of the cited prior art does not include the claimed the forming of a film by varying an applied magnetic field where the film is formed in accordance with a deposition characteristic profile based on desired electrode properties. Such a method is not within the teachings of the prior art as cited in the final Office Action. As noted above, this method provides significant advantages that are also not realized in the cited prior art. For at least these additional reasons, the cited prior art cannot support a rejection of claims 4 and 19 under § 103 and *Graham*. Therefore, the rejection of claims 4 and 19 should not be sustained.

(4) Claims 7, 8, 10, 11, 18, 22, 25, 26, 30 and 33 are patentable over Barnett, Montcalm and Kobayashi;

This rejection is respectfully traversed for at least the same reasons given above in favor of the patentability of claim 1 in light of the ineffective rejection based on Barnett and Montcalm. Therefore, this rejection should not be sustained.

(5) Claim 23 is patentable over Barnett, Montcalm, Kobayashi and Wang;

This rejection is respectfully traversed for at least the same reasons given above in favor of the patentability of claim 1 in light of the ineffective rejection based on Barnett and Montcalm. Therefore, this rejection should not be sustained.

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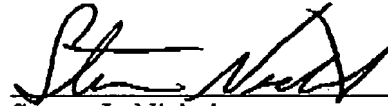
(6) Claim 37 is patentable over Barnett, Montcalm and Surampudi:

This rejection is respectfully traversed for at least the same reasons given above in favor of the patentability of claim 1 in light of the ineffective rejection based on Barnett and Montcalm. Therefore, this rejection should not be sustained.

In view of the foregoing, it is submitted that the final rejection of the pending claims is improper and should not be sustained. Therefore, a reversal of the Rejection of May 18, 2007 is respectfully requested.

Respectfully submitted,

DATE: September 7, 2007

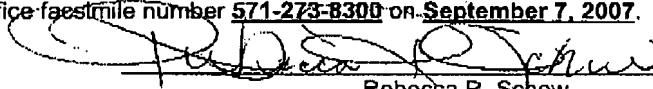


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Rebecca R. Schow

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VIII. CLAIMS APPENDIX

1. (original) A method of forming a thin-film fuel cell electrode, comprising:
providing a substrate and at least one deposition device;
developing a deposition characteristic profile having at least one porous layer based on pre-determined desired electrode properties; and
forming a film in accordance with said deposition characteristic profile by depositing material from said deposition device while varying a relative position of said substrate in relation to said deposition device with respect to at least a first axis.
2. (original) The method of claim 1, wherein forming said film further comprises varying a power supplied to said deposition device.
3. (original) The method of claim 1, wherein forming said film further comprises varying a bias of said substrate to a deposited material.
4. (original) The method of claim 1, wherein forming said film further comprises varying an applied magnetic field.
5. (original) The method of claim 1, wherein varying said relative position comprises advancing said substrate along a substrate advancement path.

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6. (original) The method of claim 1, wherein varying said relative position comprises varying a speed with which said substrate passes said deposition device.

7. (original) The method of claim 1, wherein varying said relative position comprises varying a distance at which said substrate passes said deposition device.

8. (original) The method of claim 7, wherein varying said relative position further comprises varying a speed with which said substrate passes said deposition device.

9. (original) The method of claim 1, wherein varying said relative position comprises traversing said substrate back and forth past said deposition device.

10. (original) The method of claim 9, wherein varying said relative position further comprises varying a distance in multiple directions.

11. (original) The method of claim 10, wherein varying said relative position further comprises varying a speed with which said substrate passes said deposition device.

12-14. (allowed)

15. (original) The method of claim 1, further comprising providing a second deposition device and depositing a second material from said second device onto said substrate while varying the relative position of said substrate in relation to said second deposition device with respect to at least a first axis.

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16. (original) The method of claim 15, wherein forming said film further comprises varying a power supplied to said deposition device.
17. (original) The method of claim 15, wherein forming said film further comprises varying a bias of said substrate to a deposited material.
18. (original) The method of claim 15, further comprising varying a distance between said deposition devices.
19. (original) The method of claim 15, wherein forming said film further comprises varying an applied magnetic field.
20. (original) The method of claim 15, wherein varying said relative position comprises advancing said substrate along a substrate advancement path.
21. (original) The method of claim 15, wherein varying said relative position comprises varying a speed with which said substrate passes said deposition device.
22. (original) The method of claim 15, wherein varying said relative position comprises varying a distance between said deposition devices.

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23. (original) The method of claim 22, wherein varying said relative position further comprises introducing the use of shutter to selectively block at least a portion of a material expelled from at least one of said deposition devices.

24. (original) The method of claim 15, wherein varying said relative position comprises traversing said substrate back and forth past said deposition device.

25. (original) The method of claim 24, wherein varying said relative position further comprises varying a distance in multiple directions.

26. (original) The method of claim 25, wherein varying said relative position further comprises varying a speed with which said substrate passes said deposition device.

27. (original) The method of claim 26, wherein said deposition characteristic profile comprises at least composition gradient profile and at least one morphological gradient profile.

28. (original) The method of claim 27, wherein morphological profile comprises alternating dense film layers and porous film layers having nano-chambers.

29. (original) The method of claim 28, wherein said deposition devices comprise sputter guns.

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30. (original) The method of claim 15, further comprising varying the distance between said deposition devices.

31. (original) The method of claim 15, wherein forming said film comprises introducing the use of second and third deposition devices.

32. (original) The method of claim 31, wherein forming said film comprises varying a speed with which said substrate passes said deposition devices.

33. (original) The method of claim 32, wherein forming said film comprises varying a substrate advancement path of said substrate with respect to said deposition devices.

34. (original) The method of claim 1, wherein said electrode comprises an anode.

35. (original) The method of claim 34, wherein said anode is formed from a group consisting of nickel, platinum, Ni-YSZ, Cu-YSZ, Ni-SDC, Ni-GDC, Cu-SDC, Cu-GDC.

36. (original) The method of claim 1, wherein said electrode comprises a cathode.

37. (original) The method of claim 36, wherein said cathode is formed from a group consisting of silver, platinum, samarium strontium cobalt oxide (SSCO, $\text{Sm}_x\text{Sr}_y\text{CoO}_3$).

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δ), barium lanthanum cobalt oxide ($\text{Ba}_x\text{La}_y\text{CoO}_{3-\delta}$), gadolinium strontium cobalt oxide ($\text{Gd}_x\text{Sr}_y\text{CoO}_{3-\delta}$), lanthanum strontium manganite ($\text{La}_x\text{Sr}_y\text{MnO}_{3-\delta}$) and lanthanum strontium cobalt ferrite ($\text{La}_w\text{Sr}_x\text{Co}_y\text{Fe}_z\text{O}_{3-\delta}$) and mixtures thereof.

38-66. (cancelled)

67-86. (allowed)

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IX. Evidence Appendix

None

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X. Related Proceedings Appendix

None

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XI. Certificate of Service

None